

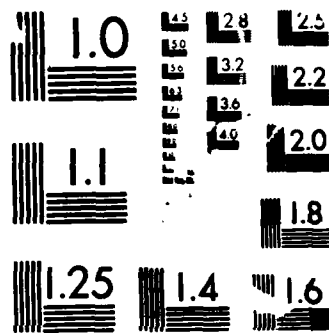
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INVESTIGATION OF THE FISHERIES OF AFRICA BUCK AND JODD
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INVESTIGATION OF THE FISHERIES OF AFRICA, BUCK, AND JUDD LAKES, LOUISIANA

by

Larry G. Sanders, John A. Baker

Environmental Laboratory

AD-A188 978

DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
PO Box 631, Vicksburg, Mississippi 39180-0631

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Final Report

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Prepared for US Army Engineer District, Vicksburg
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19. ABSTRACT (Continue on reverse if necessary and identify by block number) <p>This study was conducted in September and October of 1986 for the purpose of documenting the fish population characteristics of Africa, Buck, and Judd Lakes, Louisiana.</p> <p>Fish communities throughout the study area were dominated by gizzard and threadfin shad by numbers and weight. Sportfishes were present in each of the lakes, with white crappie being the dominant species in this group.</p> <p>Standing crop estimates are similar to those estimates obtained by other researchers in various lakes throughout the Southeast; however, standing crop estimates of sport and commercial fishes are somewhat lower, as are the percentages of available sport and commercial fishes.</p> <p style="text-align: right;">(Continued)</p>					
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19. ABSTRACT (Continued).

White crappie and bluegill appear to have favorable spawning success; however, both populations appear to be stunted. Conversely, largemouth bass do not appear to have favorable spawning success in any of the lakes sampled.

Condition factors calculated for selected species are comparable with those of similar habitats.

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PREFACE

The study described in this report was sponsored by the US Army Engineer District (USAED), Vicksburg, Vicksburg, Miss., as a part of the Upper Tensas-Cocodrie Area Study, which is under the Boeuf-Tensas Basinwide Study assigned to the Mississippi River and Tributaries Project. The work was assigned to the US Army Engineer Waterways Experiment Station (WES) under the direction of the Environmental Laboratory (EL). The USAED, Vicksburg, Project Manager was Mr. David Bennett.

This report presents results of a study designed to document the fish population characteristics in three lakes (Africa, Buck, and Judd) located in Madison Parish, Louisiana. Sampling was conducted in September and October of 1986.

The report was prepared by Messrs. Larry G. Sanders and John A. Baker, Aquatic Habitat Group (AHG), Environmental Resources Division (ERD), WES, under the supervision of Mr. Richard E. Coleman, Acting Chief, AHG; Dr. Conrad J. Kirby, Chief, ERD; and Dr. John Harrison, Chief, EL.

Special appreciation is expressed to Mr. John A. Baker and Ms. Linda E. Winfield, AHG, and to Mr. Steve Forsythe and other personnel from the US Fish and Wildlife Service, Vicksburg, Miss., for field and laboratory support. Mr. Richard L. Kasul, AHG, is thanked for assistance with data analysis. The report was edited by Ms. Lee T. Byrne, Information Products Division, Information Technology Laboratory, WES.

COL Dwayne G. Lee, CE, was the Commander and Director of WES.
Dr. Robert W. Whalin was Technical Director.

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CONVERSION FACTORS, NON-SI TO SI (METRIC)
UNITS OF MEASUREMENT

Non-Si units of measurement used in this report can be converted to SI
(metric) units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
acres	4,046.873	square metres
Fahrenheit degrees	5/9	Celsius degrees or Kelvins*
feet	0.3048	metres
pounds (mass)	0.4535924	kilograms

* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: $C = (5/9) (F - 32)$. To obtain Kelvin (K) readings, use $K = (5/9) (F - 32) + 273.15$.

INVESTIGATION OF THE FISHERIES OF AFRICA, BUCK, AND JUDD LAKES
LOCATED IN MADISON PARISH LOUISIANA

PART I: INTRODUCTION

Background

1. Several natural lakes and bayous in Madison Parish, Louisiana, are deteriorating in quality as a result of flows from Bayou Macon, via Sutt Bayou, the Tensas River, and local runoff from agricultural lands. Three of the lakes (Africa, Buck, and Judd) are within the Tensas River National Wildlife Refuge recently purchased by the US Army Corps of Engineers and the US Fish and Wildlife Service. To determine the feasibility of improving the fishery resource in these lakes, it is necessary to determine the condition and standing crop of the existing fish populations.

2. The objective of this study was to describe the general population characteristics of fishes in Africa, Buck, and Judd Lakes.

Study Area

3. Africa, Buck, and Judd Lakes are located in the northeast portion of Louisiana in Madison Parish (Figure 1) on the Tensas River National Wildlife Refuge. The lakes are relatively small and nearly equal in size (each approximately 45 acres*) and range in mean depth from 6 to 7 ft (Buck and Judd Lakes) to 10 ft (Africa Lake). Buck and Judd Lakes are surrounded primarily by agricultural land, whereas the land that borders Africa Lake is forested.

* A table of factors for converting non-SI units of measurement to SI (metric) units is presented on page 3.

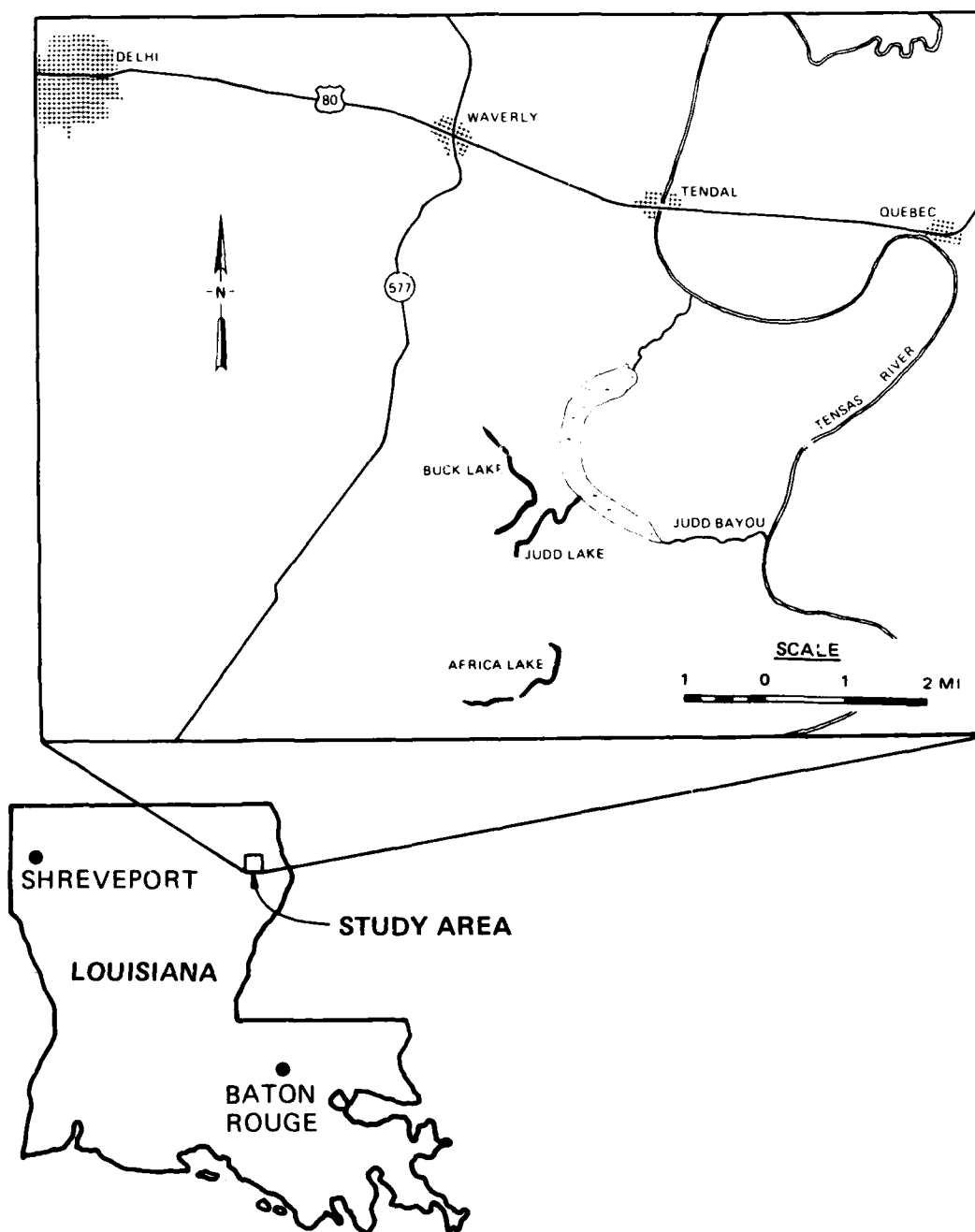


Figure 1. Madison Parish Lakes (Africa, Buck, and Judd) study area

PART II: FIELD METHODS

Chemical

4. Prior to application of rotenone in each lake, measurements of pH, dissolved oxygen (DO), temperature, and conductivity were obtained using an in situ (Hydrolab) water quality probe system. Measurements were taken at the surface and near the bottom. All measurements were taken in proximity to the fish sampling sites.

Biological

5. To estimate the standing crop of fishes in Africa, Judd, and Buck Lakes, two one-half acre plots were rotenoned in each of the lakes (Figure 1). Block-off nets (mesh size 12.7 mm stretched mesh) were used to surround each of the plots sampled. Plots were selected such that plots in each lake were located on opposite shorelines. All plots were square in configuration with the block-off net comprising three sides of the square and the shoreline on the other side. Nets used in all three lakes were 3.1 m deep. Prior to application of rotenone, a minimum of 20 depth soundings were taken inside each net and a mean depth calculated to determine the quantity of rotenone needed to reach the effective concentration of 1 mg/l. Rotenone was applied in each plot using standard techniques. Following application of rotenone, fish were collected from each plot over a 48-hr period. All fish collected were taken to shore, where individual lengths and weights were recorded. In those instances where plots exhibited high densities of small fish (those fish too small to weigh accurately), counts were made, and a group weight was recorded for each species. Potassium permanganate was applied around the outside perimeter of each plot to detoxify any rotenone that might escape through the net because of wind action or boat activity. Application of potassium permanganate averaged 2 hr/plot to reduce incidental kill.

6. In addition to standing crop estimates, data acquired were used to describe certain population characteristics, including species composition, relative abundance, standing crop, and condition factors for certain species, and to determine what percentage of sport and commercial fishes collected were

of available size following guidelines set by the Louisiana Department of Wildlife and Fisheries.

PART III: RESULTS

Water Quality

7. In situ measurements taken at each of the sampling sites revealed slight thermal stratification; however, oxygen stratification was observed in all lakes sampled (Table 1). Water temperature at Africa Lake ranged from 27.5° C at the surface to 26.5° C near the bottom, whereas DO ranged from 6.6 ppm at the surface to 3.8 ppm near the bottom. Buck Lake water temperature ranged from 25.0° C at the surface to 24.5° C near the bottom, and DO ranged from 7.3 ppm at the surface to 5.5 ppm near the bottom. Judd Lake exhibited the same trends, with a surface temperature of 28.0° C and 26.0° C near the bottom and DO values ranging from 7.0 ppm near the surface to 3.0 ppm near the bottom.

Table 1
In Situ Water Quality Data Collected from Africa, Buck, and
Judd Lakes, Louisiana

	<u>Temperature, °C</u>	<u>DO, ppm</u>	<u>Mean Depth, ft</u>
Africa	Surface 27.5 Bottom 26.5	Surface 6.6 Bottom 3.8	9
Buck	Surface 25.0 Bottom 24.5	Surface 7.3 Bottom 5.5	9
Judd	Surface 28.0 Bottom 26.0	Surface 7.0 Bottom 3.0	8

Fisheries

Species composition and relative abundance

8. A total of 6,709 fishes representing 9 families and 24 species were collected from Africa, Buck, and Judd Lakes (Table 2). There were 17 species collected from Africa Lake, 16 species collected from Buck Lake, and 16 species collected from Judd Lake. A complete list of species, including economic classification (Lagler 1956) is included in Table 2. Relative abundance based on both numbers and weight are depicted in Figure 2.

Table 2

Families, Species, and Economic Classification of Fish Captured in the
Madison Parish Lakes (Africa, Buck, and Judd) Rotenone Survey

<u>Family and Species</u>	<u>Africa</u>	<u>Buck</u>	<u>Judd</u>	<u>Economic Classification*</u>
Lepisosteidae - gars				
Spotted gar (<i>Lepisosteus oculatus</i>)		x	x	6
Longnose gar (<i>Lepisosteus osseus</i>)		x		6
Amiidae - bowfins				
Bowfin (<i>Amia calva</i>)	x			4,6
Clupeidae - herrings				
Gizzard shad (<i>Dorosoma cepedianum</i>)	x	x	x	5
Threadfin shad (<i>Dorosoma petenense</i>)	x	x	x	5
Cyprinidae - minnows and carps				
Common Carp (<i>Cyprinus carpio</i>)	x	x	x	2,4
Catostomidae - suckers				
Smallmouth buffalo (<i>Ictiobus bubalus</i>)	x	x	x	2,4
Bigmouth buffalo (<i>Ictiobus cyprinellus</i>)	x		x	2,4
Black buffalo (<i>Ictiobus niger</i>)			x	2,4
River carpsucker (<i>Carpiodes carpio</i>)	x			2,4
Ictaluridae - freshwater catfishes				
Yellow bullhead (<i>Ictalurus natalis</i>)	x	x		1,3
Channel catfish (<i>Ictalurus punctatus</i>)	x	x	x	1,2,3
Tadpole madtom (<i>Noturus gyrinus</i>)		x		6
Black bullhead (<i>Ictalurus melas</i>)	x		x	1,3
Atherinidae - silversides				
Brook silverside (<i>Labidesthes sicculus</i>)			x	5
Centrarchidae - sunfishes				
Green sunfish (<i>Lepomis cyanellus</i>)			x	1
Warmouth (<i>Lepomis gulosus</i>)	x	x	x	1,3
Orangespotted sunfish (<i>Lepomis humilis</i>)	x	x		6
Bluegill (<i>Lepomis macrochirus</i>)	x	x	x	1,3
Longear sunfish (<i>Lepomis megalotis</i>)		x		1,6
Spotted sunfish (<i>Lepomis punctatus</i>)	x			1
Largemouth bass (<i>Micropterus salmoides</i>)	x	x	x	1,3
White crappie (<i>Pomoxis annularis</i>)	x	x	x	1,3
Sciaenidae - drums				
Freshwater drum (<i>Aplodinotus grunniens</i>)	x	x	x	2,4

* Economic classification (from Lagler 1956): 1 = sport, 2 = commercial, 3 = fine food, 4 = coarse food, 5 = forage, 6 = other.

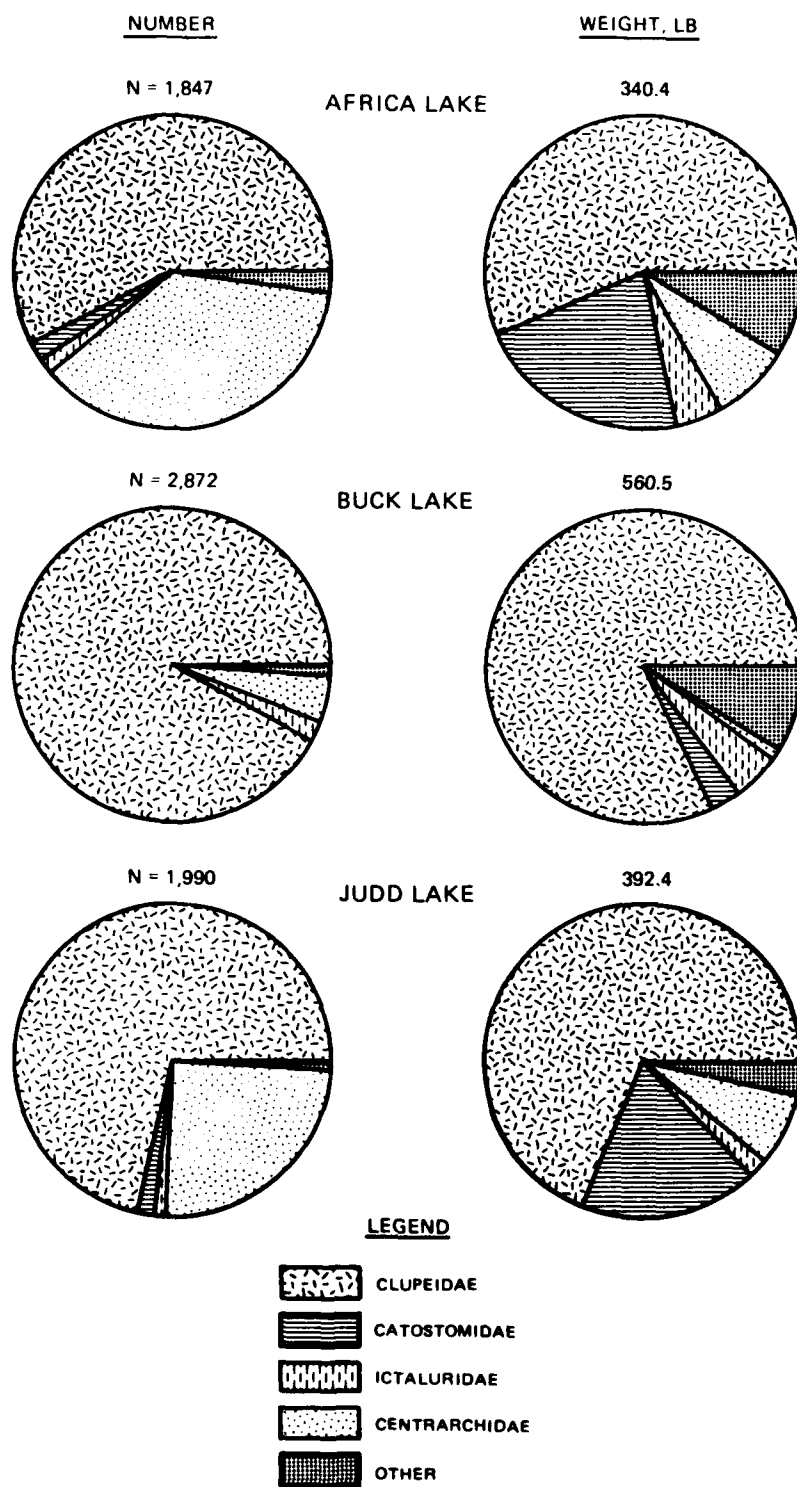


Figure 2. Relative abundance of major groups of fishes collected in rotenone samples from Africa, Buck, and Judd Lakes, Louisiana, shown by numbers (N) and weight

9. Africa Lake. The Clupeidae, including gizzard and threadfin shad, comprised 57 percent by numbers (Figure 2) of the catch in Africa Lake. Sunfish ranked second numerically, accounting for 38 percent of the catch with white crappie comprising 14.5 percent, bluegill at 18.5 percent, and largemouth bass at 0.7 percent of the total. Commercial fish represented 2.8 percent of the total numbers, and sport fish accounted for 39.6 percent (Table 3).

Table 3
Percent by Numbers and Weight of Commercial and
Sport Fish Collected from Africa, Buck, and
Judd Lakes, Louisiana

	Commercial		Sport	
	Number	Weight, lb	Number	Weight, lb
Africa	2.8	29.4	39.6	12.9
Buck	0.7	4.3	5.6	6.4
Judd	2.7	23.1	25.8	7.5

10. Buck Lake. Gizzard and threadfin shad were by far the dominant fishes collected in Buck Lake, representing 93 percent of the total numbers. The sunfish ranked second numerically but was responsible for only 4 percent of the total with white crappie comprising 2.0 percent, bluegill at 1.2 percent, and largemouth bass at 0.1 percent of the total numbers. The Ictaluridae comprised 2 percent of the total and was dominated by the channel catfish, which comprised 1.5 percent of the total numbers. Commercial fish represented 0.7 percent of the total numbers, and sport fish represented 5.6 percent (Table 3).

11. Judd Lake. Gizzard and threadfin shad comprised 71 percent of the total numbers collected at Judd Lake. Sunfish ranked second numerically with 25 percent of the total. White crappie was the dominant sunfish collected (13.7 percent) followed by bluegill and largemouth bass at 9.1 and 0.3 percent respectively of the total. The catostomidae ranked third numerically at 2.2 percent of the total and was represented by bigmouth, smallmouth, and

black buffalo. Commercial fish represented 2.7 percent of the total numbers, and game fish represented 25.8 percent.

Standing crop

12. A total of 1,293.3 lb of fishes were collected from Africa, Buck, and Judd Lakes. Standing crop estimates were 340.4 lb/acre at Africa Lake, 392.2 lb/acre at Judd Lake, and 560.7 lb/acre at Buck Lake. The Clupeidae, including gizzard and threadfin shad, comprised the highest percentage of the overall biomass in all three lakes.

13. Africa Lake. A total of 340.4 lb/acre of fish were recovered from two one-half acre plots in Africa Lake (Table 4). Gizzard and threadfin shad accounted for the greatest percentage of the standing crop at 55.6 percent and a total weight of 189.1 lb (Table 4). The standing crop of the Catostomidae (suckers) contributed 79.5 lb to the total biomass and accounted for 23 percent of the total. The standing crop of sunfishes was 27.7 lb/acre, which included 14.4 lb of white crappie, 6.4 lb of bluegill, and 4.9 lb of largemouth bass. The percentages by number of selected fishes equal to or greater than available size* were largemouth bass (46 percent), white crappie (12 percent), bluegill (28 percent), channel catfish (100 percent), bigmouth buffalo (67 percent), and smallmouth buffalo (32 percent) (Table 5).

14. Buck Lake. A total of 560.7 lb of fish were collected from the two one-half acre plots in Buck Lake. Gizzard and threadfin shad contributed 83 percent of the total biomass with a standing crop of 465 lb/acre. The Lepisosteidae (gars) were the second highest contributors to the standing crop at 34.5 lb/acre and accounted for 6.2 percent of the total. The Ictaluridae (catfishes) were third in order of abundance at 30.5 lb/acre and were represented primarily by the channel catfish. Sunfishes accounted for only 1 percent of the total biomass with white crappie contributing 2.5 lb/acre, bluegill at 1.2 lb/acre, and largemouth bass at 1.4 lb/acre. The percentages by number of selected fishes collected that were equal to or greater than the

* Available size for sport fish is an arbitrary value as there is no size limit on sport fish in Louisiana; therefore, the sizes used are based primarily on fishermen's preferences. Available size for commercial species is based primarily on the legal mesh size of nets used to harvest these fish. For the purpose of this report, six species (largemouth bass, white crappie, bluegill, channel catfish, and large and smallmouth buffalo) were examined to determine what percentage of each of these species collected in each lake was of available size.

Table 4

Standing Crop of Fish Per Acre Resulting from Two One-Half-Acre Rotenone Surveys
in Each Lake: Africa Lake, Buck Lake, and Judd Lake, Louisiana

Species	Africa Lake			Buck Lake			Judd Lake		
	No.	lb	% by wt.	No.	lb	% by wt.	No.	lbs.	% by wt.
Spotted gar	605	182.7	53.7	7	9.5	1.7	6	3.8	1
Gizzard shad	457	6.4	1.9	2,146	450.4	80.4	1,091	263.0	66.9
Threadfin shad				531	14.6	2.6	330	6.0	1.5
Carp	5	15.3	4.5	1	3.5	0.6	2	8.1	2.1
Smallmouth buffalo	25	43.6	12.8	11	16.5	2.9	28	47.3	12.1
Bigmouth buffalo	12	35.9	10.6	--	--	--	14	28.3	7.2
Black buffalo	--	--	--	--	--	--	1	1.7	0.4
Channel catfish	19	15.8	4.6	44	30.5	5.4	4	3.6	0.9
Black bullhead	2	0.82	0.2	--	--	--	10	2.9	0.8
Brook silverside	--	--	--	--	--	--	1	0.004	0.0
White crappie	267	14.4	4.2	58	2.5	0.4	272	14.7	3.7
Largemouth bass	13	4.9	1.4	3	1.4	0.2	5	0.3	0.2
Bluegill	342	6.4	1.9	34	1.2	0.2	181	6.4	1.6
Redear sunfish	2	0.54	0.2	1	0.16	0	2	0.32	0.1
Warmouth	71	1.4	0.4	18	0.30	0.1	35	0.74	0.2
Green sunfish	--	--	--	--	--	--	1	0.06	0.0
Freshwater drum	7	4.6	1.4	8	4.6	0.8	7	5.0	1.3
Bowfin	3	7.2	2.1	--	--	--	--	--	--
River carpsucker	1	0.24	0.1	--	--	--	--	--	--
Yellow bullhead	1	0.11	0	1	0.37	0.1	--	--	--
Orangespotted sunfish	13	0.05	0	2	0.009	0	--	--	--
Spotted sunfish	2	0.08	0	--	--	--	--	--	--
Longnose gar	--	--	--	4	25.0	4.5	--	--	--
Tadpole madtom	--	--	--	1	0.009	0	--	--	--
Longear sunfish	--	--	--	2	0.16	0	--	--	--
Total	1,847	340.4	100	2,872	560.7	100	1,990	392.2	100

Table 5

Minimum Available Sizes and Percentages of Fishes of Available
or Larger Size, for Africa, Buck, and Judd Lakes, Louisiana

Species*	Minimum Available** Size (total length in inches)	Percentage by Number Equal to or Greater Than Available Size	Percentage by Weight Equal to or Greater Than Available Size
<u>Africa Lake</u>			
Largemouth Bass (N=12)	9	46	91
White Crappie (N=267)	7	12	36
Bluegill (N=342)	5	28	52
Channel Catfish (N=19)	10	100	100
Bigmouth Buffalo (N=12)	16	67	79
Smallmouth Buffalo (N=25)	16	32	45
<u>Buck Lake</u>			
Largemouth Bass (N=3)	9	33	66
White Crappie (N=58)	7	9	29
Bluegill (N=34)	5	9	36
Channel Catfish (N=44)	10	73	95
Bigmouth Buffalo (N=0)	16	-	-
Smallmouth Buffalo (N=11)	16	36	64
<u>Judd Lake</u>			
Largemouth Bass (N=5)	9	20	68
White Crappie (N=272)	7	7	22
Bluegill (N=181)	5	8	39
Channel Catfish (N=4)	10	100	100
Bigmouth Buffalo (N=14)	16	36	46
Smallmouth Buffalo (N=28)	16	25	43

* N = Total number of fish collected.

** Based on state regulation or angler preference.

Note: Information on availability provided by Mr. Mike Ewing, Louisiana Department of Wildlife and Fisheries.

available size were largemouth bass (33 percent), white crappie (9 percent), bluegill (9 percent), channel catfish (73 percent), bigmouth buffalo (none collected), and smallmouth buffalo (36 percent) (Table 5).

15. Judd Lake. The standing crop of fishes in Judd Lake was 392.2 lb/acre based on the two one-half acre samples. Gizzard and threadfin shad dominated the overall catch with a standing crop of 269.0 lb/acre, which constituted 68 percent of the total. The Catostomidae were second in abundance (biomass) at 75.6 lb/acre and accounted for 20 percent of the total. Sunfishes had a standing crop of 26.1 lb/acre with white crappie contributing 14.7 lb, bluegill 6.4 lb, and largemouth bass 0.3 lb/acre. The percentages by number of selected fishes collected that were equal to or greater than the available size were largemouth bass (20 percent), white crappie (7 percent), bluegill (8 percent), channel catfish (100 percent), bigmouth buffalo (36 percent), and smallmouth buffalo (25 percent) (see Table 5).

Condition factor (K)

16. The condition factor (K) is a comparison of fish weight relative to fish length (Ricker 1970). Simply stated, the heavier any fish is for a given length, the larger the K value. The condition factor is used primarily to compare fish populations from different areas in regard to their relative well being, and there is no ideal K value established for any given species of fish. Mean values of K normally increase with age to about age five, then level out, and in some instances decrease slightly as fishes become older. For this analysis, only fishes heavier than 25 g were included to eliminate the possibility of distortions resulting from weighing errors at smaller sizes. Condition factors were calculated for three sport fishes (largemouth bass, white crappie, and bluegill) and two commercial species (bigmouth and smallmouth buffalo).

17. Condition factors for selected species are listed in Table 6. Mean values for largemouth bass (1.15 to 1.20), bluegill (1.74 to 1.79), and bigmouth buffalo (1.54 to 1.56) showed almost no differences among the three lakes. The mean K value for white crappie in Buck Lake (0.95) was slightly lower than in Africa and Judd Lakes (1.04 and 1.07, respectively). Smallmouth buffalo showed a similar pattern (1.40 in Africa Lake to 1.46 in Judd Lake, versus 1.30 in Buck Lake). Overall, however, differences in condition of these fishes in the three lakes were minor.

Table 6
Condition Factors (K) of Largemouth Bass, White Crappie, and Bluegill
Collected in Rotenone Samples from Africa, Buck, and
Judd Lakes, Louisiana

<u>Lake</u>	<u>N*</u>	<u>Mean K</u> <u>Factor</u>	<u>Standard</u> <u>Deviation</u>	<u>Minimum</u>	<u>Maximum</u>
Africa					
Largemouth bass	6	1.20	0.15	1.00	1.35
White crappie	95	1.04	0.92	0.85	1.40
Bluegill	26	1.74	0.18	1.45	2.05
Bigmouth buffalo	12	1.54	0.15	1.32	1.87
Smallmouth buffalo	21	1.40	0.11	1.15	1.64
Buck					
Largemouth bass	3	1.18	0.11	1.10	1.30
White crappie	15	0.95	0.08	0.81	1.10
Bluegill	6	1.74	0.17	1.50	1.90
Bigmouth buffalo	--	--	--	--	--
Smallmouth buffalo	11	1.30	0.13	0.96	1.50
Judd					
Largemouth bass	4	1.15	0.09	1.05	1.28
White crappie	83	1.07	0.10	0.90	1.40
Bluegill	20	1.79	0.16	1.59	2.09
Bigmouth buffalo	14	1.56	0.07	1.42	1.68
Smallmouth buffalo	28	1.46	0.10	1.26	1.71

* Sample size.

PART IV: DISCUSSION

Water Quality

18. Assessment of water quality was not an objective of this study; however, past studies concerning the water quality of Africa, Buck, and Judd Lakes have found the water quality at all sites to be fair (Mangum 1976). In situ measurements for pH, DO, temperature, and conductivity were taken at all three lakes, and the same trends were evident at each. No significant thermal stratification was observed in any of the lakes; however, DO stratification was fairly pronounced at all sites sampled.

Fisheries

19. Species composition and relative abundance were similar among the lakes investigated with gizzard and threadfin shad dominating the catch in each lake by numbers and weight. The Centrarchidae (sunfishes) ranked second in terms of numbers in all three lakes with white crappie being the dominant species represented in this group.

20. Cobb et al. (1984) found gizzard and threadfin shad to dominate the overall catch in rotenone surveys in Lower Mississippi River borrow pits both in numbers and weight.* Commercial species comprised 4.8 percent of the total numbers and 48.3 percent of the weight, and sport fishes accounted for 14.1 and 11.8 percent of the total catch and weight, respectively. Shad was also the dominant species of fish collected in two oxbow lakes in the delta region of Mississippi (Bingham 1969). Mossy Lake had an estimated standing crop of 530 lb/acre, whereas two sample plots from Wolf Lake produced estimates of 51 and 299 lb/acre.

21. The fisheries of central Louisiana lakes have been extensively investigated. Lambou (1960) in a study of seven oxbow lakes in Louisiana determined an average standing crop of fish of 202 lb/acre (see Table 7) with estimates ranging from 156 to 267 lb/acre. Sport fish comprised an average of 38 percent of the standing crop ranging from 4 to 93 percent, and

* Table 7 provides comparisons of selected rotenone studies conducted in the southeast.

Table 7
Comparison of Results Obtained from Various Rotenone Surveys
in the Southeastern United States

	Africa	Buck	Judd	Cobb et al. (1984)	Lambou (1960)	Lambou (1959)	Bingham (1969)
Number of lakes sampled	1	1	1	25	6	7	2
Number of species collected	17	16	16	$\bar{x} = 27$ range = 18.35	28 (total)	37 (total)	*
Standing crop lb/acre	340.4	560.7	392.2	$\bar{x} = 595$ Range 51-3199	$\bar{x} = 202$ Range 156-267	$\bar{x} = 397$ Range = 142-651	$\bar{x} = 294.1$ Range = 51-530
Percent of sport fish collected (biomass)	12.9 percent	6.4 percent	7.5 percent	$\bar{x} = 11.8$ percent *	$\bar{x} = 38$ percent Range 4-93 percent	$\bar{x} = 26$ percent Range 4-41 percent	*
Percent of commercial fish collected (biomass)	29.4 percent	4.3 percent	23.1 percent	$\bar{x} = 48.3$ percent *	$\bar{x} = 25$ percent Range = 49 percent	$\bar{x} = 47$ percent Range 11-76 percent	*

* Data not presented in literature.

commercial fish comprised an average of 25 percent of the standing crop ranging from 2 to 49 percent. Available commercial fish comprised an average of 20 percent of the standing crops ranging from 2 to 44 percent, and available sport fish made up 24 percent of the average standing crops of fish with largemouth bass, bluegill, and crappie all being abundant. In another study that concentrated on fish populations in backwater lakes in Louisiana, Lambou (1959) found standing crop estimates ranging from 142 to 651 lb/acre. Commercial fish comprised an average of 47 percent of the standing crops ranging from 11 to 76 percent, and available commercial fish comprised 42 percent of the standing crops ranging from 8 to 69 percent. Sport fish comprised an average of 26 percent of the standing crops ranging from 4 to 41 percent for the various lakes. Approximately 76 percent of the total poundage of game fish was of available size.

22. Other Louisiana habitats have been studied by Bryan and Sabins (1979). From their study of the Atchafalaya Basin, they obtained average standing crop estimates of 768 lb/acre in lower basin locations and 495 lb/acre in upper basin locations. The lower basin, which receives direct mainstream influence, favors the occurrence of sport fish, whereas the upper basin, which lacks direct mainstream influence, favors carp, shad, buffalo, and bowfin, species typical of unmanaged eutrophic lakes at similar latitudes.

23. The average condition factors for largemouth bass, white crappie, bluegill, and smallmouth and bigmouth buffalo were comparable with values reported by Carlander (1977) for these species in other southern US waters.

24. The relative abundances and sizes of two of the most prominent sport species, white crappie and largemouth bass, suggest that turbidity may be one of the primary factors influencing fish populations in these three lakes. During the spring months, these lakes receive a large amount of runoff and become highly turbid (unpublished information, Jerry Miller). White crappie were collected in relatively large numbers in all three lakes; however, they were primarily small fish with only 7 to 12 percent being of the available size. Largemouth bass, on the other hand, were low in abundance but often relatively large, with from 20 to 46 percent being of available size. White crappie are known to be more tolerant of highly turbid conditions than other species (Buck 1956). Conversely, largemouth bass reproduction may be adversely affected by high turbidity (Bulkley 1975); this has recently been documented for Moon Lake, in the Mississippi Delta. During years following

low spring rainfall (and thus low turbidity), young-of-the-year largemouth bass are more abundant than following wet springs (unpublished information, Gary Lucas). Highly successful crappie reproduction and competition with shad for plankton may combine to produce the large numbers of small, possibly stunted white crappie found in these lakes. Another possibility is an unusually strong 1985 year class. Carlander (1977) relates that white crappie are prone to produce strong year classes that suppress subsequent ones for several years. Without data on ages of these fish, we cannot specifically determine which of these possibilities exist in the three lakes sampled.

PART V: CONCLUSIONS

25. Overall, standing crop estimates for Africa, Buck, and Judd Lakes are similar to those estimates obtained by other researches in various lakes throughout the southeast. Standing crop estimates of sport and commercial fishes, however, are somewhat lower, as are the percentages of available sport and commercial fishes.

26. White crappie and bluegill appear to have favorable spawning success; however, both populations appear to be stunted, possibly because of competition with the high densities of gizzard and threadfin shad encountered in all three lakes sampled.

27. Largemouth bass do not appear to have favorable spawning success, and it appears likely that this is attributed in part to high turbidity levels that occur during their spawning season.

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